

INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference 14051-2	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/CA 03/01328	International filing date (day/month/year) 11.09.2003	Priority date (day/month/year) 11.09.2002
International Patent Classification (IPC) or both national classification and IPC H02K41/06		
Applicant E.D.M. RESOURCES INC. et al.		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 7 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 807 of the Administrative Instructions under the PCT).

 These annexes consist of a total of sheets.

- This report contains indications relating to the following items:
 - ☒ Basis of the opinion
 - ☐ Priority
 - ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☐ Lack of unity of invention
 - ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Certain documents cited
 - ☐ Certain defects in the international application
 - ☐ Certain observations on the international application

Date of submission of the demand 08.04.2004	Date of completion of this report 11.02.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Ramos, H Telephone No. +31 70 340-2517 

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I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-33 as originally filed

Claims, Numbers

1-19 as originally filed

Drawings, Sheets

1/27-27/27 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-19
	No: Claims	
Inventive step (IS)	Yes: Claims	1-19
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-19
	No: Claims	

2. Citations and explanations

see separate sheet

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Reference is made to the following document:

D1: PATENT ABSTRACTS OF JAPAN vol. 011, no. 077 (E-487), 7 March 1987
(1987-03-07) & JP 61 231863 A (HAAMONITSUKU DRIVE SYST:KK), 16
October 1986 (1986-10-16)

In the opinion of the IPEA, the claimed invention generally appears to be novel, to involve an inventive step, and to be industrially applicable.

1. Independent claims 1 and 2

1.1 Document **D1** (see figure and abstract), which represents a relevant state of the art to the subject-matter of the claimed invention, describes an harmonic drive (spline gear) motor comprising:

- a cylindrical laminated stator core with a set of windings
- flexible permanent magnets pieces mounted on a flexible spline having a cylindrical and disc/annular portion
- the flexible spline is fixed to the stator and has a toothed internal spline gear
- a coaxial rotor shaft hub with complementary externally toothed gear drives the mechanical load

1.2 The subject-matter of claim 2 differs from this prior-art document **D1** in that:

- the spline is mounted around the stator core (inner stator core)

Moreover, the subject-matter of claim 1 (which is the alternative preferred embodiment to claim 2, with *reversed "spline to output ring" gear orientation*) further differs in that:

- the shaft hub has internally toothed gears complementing the externally toothed gear of the spline

1.3 The subject-matter of claims 1 and 2 are therefore novel (Article 33(2) PCT).

1.4 The problem to be solved by the present invention may be regarded as "how to improve the rated output torque/power and overall efficiency of the spline motor".

1.5 The solution to this problem, as proposed by the present application, is obtained by the stator core being surrounded by the distorting flexible spline. This configuration implies the use of a "larger diameter" spline (and by extension also "thicker walled"), which improves magnetic and torsional stiffness characteristics of the flexible spline,

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maximizing torque, power transfer and overall efficiency.

- 1.6 The mentioned prior-art is silent in regard to the effects originated by the technical characteristics mentioned above, and they don't appear to be obvious to the man skilled in the art.
- 1.7 The subject-matter of either claims 1 and 2 is therefore inventive (Article 33(3) PCT).
- 1.8 It is also recognized that the claimed invention is suited for applications where compact, high torque, low speed motors are necessary.
- 1.9 The subject-matter of either claims 1 and 2 is therefore industrially applicable (Article 33 (4) PCT).

2. Independent claims 5 and 6

- 2.1 The subject-matter of claims 5 and 6 cover, respectively, the flexible spine motor of the above mentioned independent claims 1 and 2 (which are themselves alternative embodiments, with reversed "spline to output ring" gear orientation). All technical features of claims 1 and 2 are present in claims 5 and 6, that are further characterized by the *"output gear hub being connected to a shaft that is supported by bearings to a central hollow post (or spindle)"*.
- 2.2 Although claims 5 and 6 having been drafted as separate independent claims, they appear to relate effectively to the same subject-matter of independent claims 1 and 2. The aforementioned set of claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT. This objection can be overcome by drafting claims 5 and 6 depending on claim 1 and 2.
- 2.3 Nevertheless, and inasmuch as claims 1 and 2 appear to be new and inventive, the subject-matter of either claim 5 and 6 appear also to comply with the requirements of Article 33 PCT in such an amended form.

3. Dependent claims 3, 4, 7 and 8

- 3.1 Claims 3, 4, 7 and 8 are dependent on claims 1, 2, 5 and 6 respectively, and therefore also appear to comply with the requirements of Article 33 PCT.

4. Independent claims 9, 11, 13 and 14

- 4.1 The subject-matter of independent claims 9, 11, 13 and 14 is directed to the structure

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of the electromagnetic core for a flexible spline motor.

- 4.2** Although claims 9, 11, 13 and 14 are drafted as a separate independent claims, they appear to relate effectively to the same subject-matter of independent claims 1 and 2. The aforementioned set of claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT. This objection can be overcome by drafting those claims depending on claim 1 and 2.

5. Independent claims 16 and 17

- 5.1** Although claims 16 and 17 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter of claims 1 and 2, and to differ from each other only in respect of the terminology used for the features of the subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.

6. Independent claim 18

- 6.1** The subject-matter of claim 18 is directed to the flexible spine motor of the above mentioned independent claims 1 and 2. All technical features of claims 1 and 2 are present in claim 18, that is further characterized by:
- flexible spline overwound with a magnetically permeable tape (claim 3 or 4)
 - rotor and stator with given radial elasticity
 - relation of number of gear teeth
 - stator coils arrangement
 - cyclic-operation and commutation of the stator coils
 - rectangular core teeth profile
- 6.2** Although claim 18 being drafted as a separate independent claim, it appear to relate effectively to the same subject-matter of independent claims 1 and 2. The aforementioned set of claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT. This objection can be overcome by drafting claim 18 depending on claim 1 and 2.
- 6.3** Nevertheless, and inasmuch as claims 1 and 2 appear to be new and inventive, the subject-matter of claim 18 appear also to comply with the requirements of Article 33 PCT.

7. Independent claim 19

- 7.1** The application does not meet the requirements of Article 6 PCT, because claim 19

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is not clear. A *wire* cannot "comprise" the *stator field winding*, but rather the *stator field winding* can "be comprised of" *wire*. On the other hand, to maintain unity of invention (Rule 13 PCT) the claim has to be directed to a flexible spline motor.

- 7.2** Although claim 19 has been drafted as a separate independent claim, it appears to relate effectively to the same subject-matter of claims 1 and 2, and therefore to be more adequately drafted as dependent on such claims.

8. Other remarks

- 8.1** The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
- 8.2** The term "flexispline motor", used throughout the application, is not readily recognized in the art of dynamo-electrical machines. In order to improve clarity, it would appear to be more appropriate to substitute this expression in the claims by the wording "flexible spline motor", as stated in page 2 lines 14-15 of the description (Article 6 PCT).